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When is an exercise in logic also a logic game?

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ABSTRACT: This paper looks to Bernard Suits's analysis of games and game playing for at least a partial answer to the question in its title. It applies Suits's analysis to Sudoku, a popular logic puzzle, and to Analytical Reasoning, a question type in standardized assessments. The purpose is both to test Suits's analysis in a novel domain and to give educators and test developers useful insight into the relationship between logic exercises and games.

KEYWORDS: games, logic exercises, teaching, testing

1. INTRODUCTION

Bernard Suits's analysis of games and game playing has been called "the gold standard against which other such efforts are judged" (Kretchmar 2008: 142). This may not be an overstatement, given that Suits has been cited in thirty percent of articles published in the *Journal of the Philosophy of Sport* between 2000 and 2008 (Holowchak 2008: 117). This ubiquity is in large part attributable to the account's remarkable resistance to counterexample, and it's also a testament to the light that it sheds on the concept of a game.

Suits's definition of game playing has been put to the test with many different games and game-like activities since it was first introduced in the late 1960s, but it has not to my knowledge been applied to logic games, by which I mean games in which winning (which could amount to solving a puzzle) is achieved entirely, or at least mainly, through the use of deductive reasoning.[1] This paper will address this small gap in the literature on games by applying Suits's definition to two exercises in logic that have at times been characterized as logic games. While this turns out be an interesting test for Suits's definition, the primary objective is to see what this definition implies about the boundary between a true logic game and a mere exercise in logic.

The first putative logic game addressed in this paper is Sudoku, which intuitively seems a preeminent example of a logic puzzle, hence a logic game. Sudoku has been a very popular recreation since it burst on the puzzle scene in 2005. Though it has its roots in a serious mathematical construction known as Latin squares (Freeman 2005), it was conceived as a recreational activity and is, to my knowledge, performed only as a recreational activity. The second putative logic game is known as Analytical Reasoning (AR). AR is an assessment tool in postgraduate admission tests, and it was conceived as such; it has been part of the LSAT since 1982 and it was part of the GRE General test until 2002.

[1] Most games are not logic games by this definition. While many games involve deductive reasoning, it is usually subordinate to things like strategy, memory, verbal creativity, or mere luck.

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Despite its serious purpose, AR is popularly called "logic games" by people preparing for the LSAT and by the test preparation companies that serve them.

Suitsian analyses of these exercises should, if all is well, give us convincing categorizations of both Sudoku and AR. The hope is that our analyses will yield insights that can be applied to logic games more generally. Such insights would have practical implications for anyone who wants to draw a distinction between a logic game and a close non-game cousin. This paper will conclude with a look at some of these implications for logic exercises in the contexts of teaching and testing.

2. SUITS'S ANALYSIS OF GAME PLAYING

To understand Suits's definition of game playing, you need to become familiar with its three elements: the prelusory goal, constitutive rules, and lusory attitude. For Suits these are the required elements of any game.

The prelusory goal of a game is a goal that can be described independently of that game. It is a "specific achievable state of affairs" (Suits 1978: 36), such as having your golf ball go into the hole (by whatever means) or crossing a line on the track before the other racers do. This contrasts to a lusory goal, which is a goal that can be reached only by virtue of game play and can be described only in terms of the game itself. The preeminent lusory goal is winning the game, but not losing badly can also be a worthy lusory goal. The lusory goal is dependent on the prelusory goal in that you cannot achieve the lusory goal without achieving the prelusory goal.

If you are playing a game, you must achieve the prelusory goal in a way that conforms to the game's constitutive rules. These are the rules that define the particular game in that "…to break a constitutive rule is to fail (at least in that respect) to play the game at all" (Suits 1978: 38). They do not include rules that merely regulate game play, like the rule in hockey that calls for a two minute penalty for hooking, and they do not include rules of skill—directives like "keep your stick on the ice." The constitutive rules might be just a small part of the game's associated rules, and they can be so basic that anyone but a neophyte takes them for granted. In golf, for example, we have the constitutive rule that you may only propel the ball toward the hole using one of your clubs. In a footrace, we have the constitutive rule that you may not trip your competitors.

A crucial feature of Suits's account is that it holds that in a game the constitutive rules always function to "prohibit use of the most efficient means for reaching a prelusory goal" (1978: 38). For Suits, constitutive rules define the game by setting up obstacles that you must overcome when you engage in that game.

The final element of Suits's definition is that an activity does not constitute game playing unless the constitutive rules are accepted for the sake of making participation in that activity possible. This third requirement of game playing is known as lusory attitude. The fact that a game player has lusory attitude provides a minimal explanation of the why the player adopts rules that require using inefficient means of reaching a goal even when far more efficient means are available: the player does this because it makes participation in the game possible.

Everything is now in place for Suits's definition:

> To play a game is to attempt to achieve a specific state of affairs [prelusory goal], using only means permitted by rules…, where the rules prohibit use of more efficient in favour of less efficient means [constitutive rules], and where the rules are accepted just because they make possible such activity [lusory attitude]. (1978: 41)

3. SUDOKU

3.1 The Basics

The elements of Sudoku are easy to pick up. You are faced with a 9 × 9 grid, divided into nine 3 × 3 subgrids. The puzzle setter has already put some of the digits 1 to 9 in some of the grid's 81 boxes. To solve the puzzle, you need to complete the grid by placing one digit in every box in such a way that each row, each column, and each 3 × 3 subgrid contains the digits 1 to 9 exactly once. A well-constructed puzzle, such as the one that follows, has a unique solution.

	a	b	c	d	e	f	g	h	i
A			7		9			8	5
B			6			8			3
C				6	2	5	9		7
D		5		2		3			
E	1		4	9		6	3		2
F				1		4		7	
G	2		8	5	1	9			
H	6			8			4		
I	9	3			6		5		

Fig. 1 Sudoko grid

In solving a Sudoku, you find yourself repeatedly relying on three main rules. The *column rule* says that every column in a completed puzzle must include the numerals 1 through 9. The *row rule* says that every row in a completed puzzle must include the numerals 1 through 9. And the *subgrid rule* says that every demarcated 3x3 subgrid in a completed puzzle must include the numerals 1 through 9. Every inference you need to make to complete a Sudoku is made by applying some combination of these rules to the partially completed grid, either to the initial numerals placed there by the puzzle setter or to the numerals that you place there yourself based on earlier inferences.

For example, in the puzzle above, you can deduce that [f,A] must be 1 because there needs to be 1 in that subgrid (by the subgrid rule) and the column rule rules out [d,A], [d,B], and [e,B] as suitable squares. Next we can see that [d,A] must be 3 since [d,B] and [e,B] are ruled out by the row rule (and the subgrid rule dictates that there must be a 3 in that subgrid). We can now deduce that 4 and 7 must occupy [d,B] and [e,B], but we don't have enough information at this point to determine which number goes in which square. Not all inferences in Sudoku are as easy as these, but you get the idea.

3.1 Is Sudoku a Game?

It's easy to see that despite the use of numerals, solving a Sudoku puzzle is a matter of logic. But is it a logic *game*? To apply Suits's definition, we'll have to identify a candidate for the prelusory goal of Sudoku: a specific achievable state of affairs that can be described independently of the game of Sudoku. Our candidate for the prelusory goal needs to leave room for the constitutive rules; if a constitutive rule were built into our description, we would be on our way to describing the lusory goal. With this in mind, the best candidate for the prelusory goal of Sudoku is nothing more complicated than placing digits in the unfilled squares of the grid.

The constitutive rules of Sudoku would have to include the column rule, the row rule, and the subgrid rule, and you can also add the implicit rule that you should not place more than one digit in a square. And you can also add the general rule for puzzles that forbids peeking at the answer (if there is one available).

The puzzle-setter's initial placement of digits could be interpreted as being another set of rules in Sudoku; each placement could be understood as being a rule of the form "there must be an *n* in position [x,Y]." Like the constitutive rules that we've identified, these "rules" also prohibit the most efficient means of attaining a prelusory goal. But it would be a mistake to hold that the initial placement belongs to the set of constitutive rules. Our task is to identify the constitutive rules for Sudoku as a general activity, not to identify the constitutive rules for one particular Sudoku puzzle. The puzzle setter's initial placement of digits is akin to the initial placement of the playing cards at the start of a game of solitaire.

Two elements of game playing are in place for Sudoku. The third, lusory attitude, falls into place quite naturally. In the typical case, the aspiring Sudoku-solver accepts the constitutive rules of Sudoku because she wants to solve the puzzle for the sake of inherent enjoyment. She accepts the rules because doing so makes it possible to participate in that activity and she thus has lusory attitude. There could also be atypical cases, in which someone does Sudoku puzzles for instrumental reasons—e.g., in order to impress someone or to win cash prizes at Sudoku tournaments. But even in these cases the Sudoku-solver is also accepting the rules of Sudoku because doing so makes the activity possible. It hardly seems possible to imagine a Sudoku aficionado who doesn't have lusory attitude, and so doing a Sudoku puzzle is clearly an instance of game playing by Suits's definition.

4. ANALYTICAL REASONING (AR)

4.1 The Basics

An AR exercise begins with what we'll call its setup. This generally begins with a description of a situation in which an actor needs to accomplish a particular task. (The actor may or may not be explicitly mentioned.) The tasks typically involve ordering a set of entities appropriately, grouping entities appropriately, or both ordering and grouping. The initial description is followed in the setup by a number of rule-like constraints on the completion of the task. The setup itself is followed by a series of multiple-choice questions that force you to comprehend what must be true and what could be true in the situation you've been presented with.

Here is an AR setup from the December 2009 LSAT:

> A museum curator is arranging seven photographs—*Fence*, *Gardenias*, *Hibiscus*, *Irises*, *Katydid*, *Lotus*, and *Magnolia*—on a gallery wall in accordance with the photographer's requirements. The photographs are to be hung along the wall in a row, in seven positions sequentially numbered from first to seventh. The photographer's requirements are as follows:
> *Gardenias* must be immediately before *Katydid*.
> *Hibiscus* must be somewhere before *Katydid* but cannot be the first photograph.
> *Irises* and *Lotus* must be next to one another.
> *Magnolia* must be one of the first three photographs.
> *Fence* must be either first or seventh.

The AR setup is always followed by a number of questions such as this one:

> Where each photograph is hung is fully determined if which one of the following is true?
>
> (A) *Gardenias* is fourth.
> (B) *Hibiscus* is second.
> (C) *Irises* is second.
> (D) *Lotus* is first.
> (E) *Magnolia* is third.
>
>

One could approach this question by considering (and possibly diagramming) the consequences of each of the five options in turn until you find the one that fully determines the positions of the photographs. A less 'brute-force' approach (and perhaps a more efficient one time-wise) is to first find an option that you think—given your understanding of the photographer's five requirements—will unleash a set of consequences that tightly constrains the positions of the photographs. You can then test out that option to see if it fully determines their positions.

Given the photographer's third and fourth requirements, you can see that (D) is going to result in knowing that *Lotus*, *Irises*, and *Magnolia*, in that order, go to the first three positions. Now, you can see from the fifth condition that *Fence* goes to the seventh position. The first and second condition now tell you that *Hibiscus*, *Gardenias*, and *Katydid* will go to positions four, five, and six, respectively. And so we have our answer.

The AR setup together with its associated questions is referred to as an AR set. AR sets are administered under timed conditions in standardized tests. In the LSAT, for example, candidates have 35 minutes to complete four sets of five to seven AR questions.

4.2 Is AR a Game?

In identifying likely candidates for the prelusory goal and constitutive rules of AR it is important to not get distracted by the setup of the AR exercise, which invariably identifies a goal and sets out a number of explicit rule-like conditions. These rule-like conditions look like the constitutive rules we seek, in that they prohibit the most efficient means of reaching the goal stated in the AR setup in favour of some less efficient means. Moreover, these conditions were clearly devised for the sake of supporting the inferences in an AR set (i.e., for the sake of making the AR set possible). But we need to recognize that the goal identified within an AR setup (e.g., determining the placement of the photographs on the gallery wall) could not possibly serve as a prelusory goal of AR because that goal belongs to a fictive actor that has been either presupposed or explicitly identified within the AR setup (e.g., the museum curator). The prelusory goal that we are looking for would be one held by the real people who tackle AR sets. (We'll call them AR takers hereafter.)

The AR taker needs to analyze a problem faced by the fictive actor in the setup, so it's *as if* the AR taker is engaging in the fictive activity. But this is merely a stance that the AR taker adopts as a means to attaining her own goal of getting the correct answers for a set of multiple choice questions. This goal is our best (and only) candidate for the prelusory goal of AR, but one more thing needs to be specified. The prelusory goal of AR needs to be free of limitations on the means by which you may obtain the correct answers to the questions. Those limitations are the province of the constitutive rules. So if an AR exercise has a prelusory goal it must be this: to get as many correct answers as possible to the associated questions, *by whatever means you choose*.

For the constitutive rules of AR we need to find rules that encompass all possible AR sets, and this means bypassing the rules in the conditions stated within each AR setup. In doing this we follow the same approach we took with Sudoku, in which we identified constitutive rules that apply to every possible Sudoku puzzle and did not look for constitutive rules in the puzzle-setter's initial placement of digits in the grid.

But AR is not a tightly circumscribed activity like Sudoku, which always has the same basic framework and the same three explicit rules (the column rule, the row rule and the subgrid rule). AR setups can have many different structures and can incorporate many different types of constraints. Perhaps that explains why we are able to identify just two constitutive rules for AR.

The first of these constitutive rules can be summed up as follows: answer the questions by means of reasoning alone. This rule has the function of a constitutive rule in that it prohibits more efficient means of achieving the prelusory goal in favour of less efficient means. It also distinguishes AR from certain similar activities that we would not countenance as AR. Consider the various prohibitions that follow from this directive, including a prohibition on copying your answers from your neighbour, a prohibition on using psychic clairvoyance to identify the correct answers (if you should happen to possess this extraordinary gift), and a prohibition on using a computerized AR-solver. Anyone who violates one of these prohibitions is not doing AR as we know it. The answer-copier

is not really doing AR but cheating at AR. The clairvoyant is exercising a remarkable skill, but that skill has little to do with AR and could presumably work just as well with any other test question. And the user of the AR-solver, even if she were to program this ingenious device herself, is not doing AR either.

The second constitutive rule that we can discern for AR is a prohibition on using more than the allotted time to complete the AR sets. This rule applies to AR only when it is a timed activity, as in actual testing conditions or in a timed practice. It would not apply, of course, to someone tackling AR questions without time constraints, for practice or whatever reason. This latter activity also seems intuitively to count as taking AR, but we will not examine it here. We limit our attention to AR taken under timed test conditions: this activity seems definitive for AR and it poses the more interesting challenge for Suits's account.

These two constitutive rules are certainly not unique to AR. The first is also a constitutive rule of Sudoku and other logic games. And both rules are constitutive for any timed test of reasoning. Still, these constitutive rules are all we need to identify for the purposes of this paper. Just one constitutive rule would suffice so long as we can discern the relationship between that rule and the prelusory goal and the rule gives us an adequate basis for assessing the AR takers' lusory attitude.[2]

This brings us to the question of whether the AR taker has lusory attitude. Recall that to have lusory attitude regarding a particular activity, it must be true that "the [constitutive] rules are accepted just because they make possible such activity."

One might think that AR takers quite clearly fail to have lusory attitude because they accept the constitutive rules not *just* for the sake of making the activity possible but for instrumental reasons too: they also accept those rules because they want to get good scores on a standardized test and want to gain acceptance into a postgraduate program. This is not how Suits's notion of lusory attitude works however: Suits makes it clear that lusory attitude should not be understood as excluding the possibility that the constitutive rules are *also* accepted for some other reasons. Instead, lusory attitude should be understood merely as excluding the possibility that constitutive rules are accepted for reasons that are not also reasons for making the activity possible. (1978:144) If lusory attitude is properly understood then, we see that the mere fact that there are instrumental reasons for taking AR does not mean that the AR taker is not playing a game. Or as Suits puts it more generally, "…games can function as instruments without thereby ceasing to be games…" (1978: 146).

To reach a verdict about whether the AR taker has lusory attitude, it is useful to consider an example that Suits gives of someone who clearly lacks lusory attitude.

> Smith arrives at the starting line of the 200 metre finals just as the race is about to begin. He has only that moment learned that a time bomb has been planted in the grandstand at the finish line (which is located on the other side of the oval track at a point directly opposite the starting line), and that it will go off in a matter of seconds. The information has so shocked Smith that he is temporarily bereft of speech and so cannot warn anyone of the impending catastrophe. His first impulse is to run straight across the infield and defuse the bomb, but he

[2] Even if these were the only constitutive rules of AR, it would not be a problem for Suits's account, which is amenable to games having a very minimal set of constitutive rules. Suits (1978: 82-87) argued that mountain climbing, for example, meets his definition of a game, based on a constitutive rule that prohibits one from reaching a summit using mechanical transport, even if this is a mere limitation in principle, as it is for mountains on which mechanical transport is infeasible.

> sees with dismay that the infield has been fenced off with a high chain-link barrier, evidently to protect spectators and participants from the fifty or so man-eating tigers that roam hungrily inside the enclosure. At the instant Smith realizes that his only hope of getting to the bomb in time is to make a half circuit of the track, the starting gun is fired, and Smith and the other entrants are off and running hard. (1978: 145)

Smith runs the race without violating any constitutive rule of the 200 metre sprint, and he has the appropriate prelusory goal—that of crossing the finish line. But Smith is not participating in a competitive game like the other sprinters. Smith lacks lusory attitude because, unlike the other sprinters who accept the rules because they want to participate in the competition, Smith acted within the rules because there was no other means of reaching the bomb in time. "Clearly, his attitude toward the rules was not that they made possible a foot race, for if he had found his voice or if the infield had been safe and clear, he would not have been running around the track at all" (1978: 145).

Compare Smith with a one example of someone who has lusory attitude and for whom a game functions as an instrument—the professional athlete. The fact that the constitutive rules of the game make the activity possible is always a reason that the professional athlete accepts those rules. This might be because he enjoys playing the game, but even if he does not enjoy playing it, he has a financial interest in making the activity possible. His reasons for accepting the constitutive rules are also reasons for making the activity possible.

The question of whether the AR taker has lusory attitude comes down to whether the AR taker is of a kind with Smith the sprinter or of a kind with the professional athlete. There is no tidy answer to this question, however. While Smith and the professional athlete are in situations that make their attitudes toward the constitutive rules clear, there are a variety of reasons for which AR takers might accept the constitutive rules of AR. Consider three possible reasons in turn.

First, suppose that the reason that the AR taker abides by the two constitutive rules that we've identified is the test supervisors' enforcement of rules that leave reasoning ability as her only available means of answering the questions and that prevent her from using more than her allotted time. This AR taker accepts the constitutive rules because she has no choice in the matter, given her desire to be admitted to a postgraduate program. Like Smith, she is in a situation in which acting within the constitutive rules is the only way to get what she wants, and if some other means of achieving the prelusory goal were available to her and she deemed that means to be a more efficient, she would use that means. So, just like Smith, this AR taker lacks lusory attitude.

Now suppose instead that the AR taker abides by the two constitutive rules for ethical reasons. She recognizes that it is ethically wrong to cheat on a standardized test and recognizes that any violation of the constitutive rules that would possibly serve her purposes (e.g., copying someone else's answers) would constitute cheating. The similarity to Smith is not as strong in this case because the constraints are not imposed externally. It is nevertheless clear that this AR taker does not have lusory attitude since her reason for accepting the constitutive rules of AR is not also a reason for making the activity possible.

Finally, suppose instead that the AR taker is antecedently disposed to seek excellence in AR and like activities. The excellence that this AR taker seeks is inextricably bound to abiding by the two constitutive rules. So this person accepts the constitutive rules of AR because those rules make participation in that activity possible. Suppose further that this person's disposition to seek excellence is strong enough that the ethical reasons for ac-

cepting the constitutive rules do not come into play for her, nor does the threat of enforcement. This AR taker has lusory attitude. She might also be taking AR for an instrumental reason—to gain admission into a certain postgraduate program—but this reason is also a reason for making the activity possible. As with the professional athlete, the fact that excellence in the activity serves instrumental purposes does not preclude lusory attitude.

While hard empirical evidence about people's reasons for accepting the constitutive rules of AR is not available, it seems very likely that there are some AR takers of each sort described above. Ethical reasons for accepting the constitutive rules and enforcement-motivated reasons are surely in play for AR takers. These are the standard and familiar motivations for not cheating on a test. As for the third sort of AR taker, she might be a rare individual, but she's not wildly out of the ordinary. This person is dedicated to the pursuit of excellence in exercising her reasoning abilities, and this dedication is not outweighed by a dedication to achieving the prelusory goal, that of getting as many correct answers as possible. So she needs no reason other than this disposition toward excellence to abide by the constitutive rules of AR. Note that this state of affairs does not have to come about because of an extreme dedication to the pursuit of excellence in reasoning; it can also come about because of a comparatively modest commitment to AR's prelusory goal.

We conclude with some confidence then that AR is a game for some people who engage in it and that it is not a game for others. The distinction between those AR takers who are playing a game and those who are not rests on individual dispositions. The AR taker who is playing a game seeks excellence in that activity for its own sake, for the instrumental benefits to be gained from excellent performance, and for no other reason. Thus her reasons are consonant with lusory attitude. AR takers who are not playing a game seek excellence in AR for instrumental purposes and they might also seek excellence for its own sake, but they also have other reasons for accepting the constitutive rules—ones that are not reasons for making the activity possible. These reasons are not consistent with lusory attitude.

4.3 What AR Tells Us about Suits's Account

This mixed verdict on AR—that it is a game in some instances and is not a game in others—does not amount to a break from Suits's stated views. Suits's account allows that one competitor might be playing a game while another in the same event might be failing to play a game, as Suits himself makes clear regarding Smith the sprinter: "I put it to you that…the other runners are playing a game but that Smith is not, and that this is so because the other runners have lusory attitude and Smith does not" (1978: 145).

Neither should this mixed verdict lead us to think any less of Suits's account of game playing. The idea that AR can be a game for some people has intuitive appeal. Some people actually sit down to solve AR sets for enjoyment alone. So it should not come as a surprise that an activity such as this should be recognized as game playing under Suits's definition, which is generally recognized as being a very inclusive one. (See Kretchmar 2008: 144.)

One might think that Suits's definition should give an unequivocal answer to the question of whether AR is a game, but that betrays a misunderstanding of Suits's project. Suits does not actually engage in a direct analysis of games: he never speaks of the necessary and sufficient conditions under which *X is a game* but is always careful to speak of

the necessary and sufficient conditions of what it is *to play a game* (1968: 148; 1978: 41; 1988: 11). Many of those who build on Suits's work are similarly careful to preserve this distinction (Hurka 2006: 217) though some seem to glide over it (Kretchmar 2008: 142). Of course, the fact that Suits did not analyze games directly did not prevent him from reaching conclusions about games; it merely meant that what he concluded about games was derived from his analysis of game playing.

5. CONCLUSIONS

5.1 For Educators

Educators who try to include games (logic games or otherwise) in their course work can sometimes face the question of whether the exercises that they have in mind really are games. Our conclusion about AR leads to a reframing of this question, however. Our analysis of AR, if it is correct, suggests that the pertinent question for these educators might not be whether a particular exercise is or is not a game, but for *how many* students is the exercise a game.

If AR can be a game for some people but not for others, there is good reason to believe that the same can hold true of classroom logic exercises. This is not so much because of similarity in content, but because both AR and classroom logic exercises are compulsory activities. AR is compulsory for anyone who wants to gain admission into certain postgraduate programs and classroom exercises are generally a compulsory part of the syllabus. So AR and would-be classroom games have in common the fact that they bring people who are predisposed to seek excellence in those sorts of activities together with people with little inclination to do so. The usual sorts of games, like baseball or Parcheesi, don't do this. Players of those games are generally a self-selected lot: those with an appreciation for the game choose to play and those without such an appreciation choose not to.

The reframing of the question leads to the issue of whether a classroom logic exercise can be enhanced to increase the number of students who experience it as a game. The picture that emerged from our Suitsian analysis of AR and from our comparisons between AR and Sudoku is that the crucial element that can make a logic exercise a game is the participants' disposition toward that exercise—whether they possess lusory attitude. Logic exercises like AR and Sudoku meet the other requirements of game playing—a prelusory goal and constitutive rules—leaving lusory attitude as the make-or-break requirement. So the question becomes that of whether and how lusory attitude can be encouraged among students. A full answer to that question is beyond the scope of this paper, but it certainly does seem that lusory attitude can be encouraged by engineering logic exercises in just the right way. This engineering needn't change the actual content of a logic exercise; it can be confined to the setting for that content. For example, elements of competition, reward, recognition, and "team play" can by themselves change participants' attitudes toward an activity.

5.2 For Test Developers

Some test developers are interested in designing tests of cognitive skills that test takers will experience as games (Shute et al., 2008: 1-7). The preceding conclusions for educa-

tors also apply to their situation. Most developers of major standardized tests, however, are probably keen to avoid elements of game play in their tests. Standardized tests, after all, are an important part of the educational system with life-changing consequences for many thousands. Hence the charge that people's futures are affected by their performance on mere 'games' could be a stinging accusation. For test developers who shun 'gaminess' in their assessments, however, the results of our Suitsian analysis of AR should not be troubling. While AR might be game playing for a small percentage of the people who engage in it, it is unreasonable to say that an activity is a game in any robust sense if it is experienced as a game by just a small minority of participants. After all, if some people managed to make filling out their tax forms into a game, that would not mean that doing taxes is a game. Suits's account does not support the view that AR is a logic game in the full sense—the "fully subscribed" sense in which Sudoku is a logic game.

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Gaming Logic: Commentary on "WHEN IS AN EXERCISE IN LOGIC ALSO A LOGIC GAME?" by David Kary

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1. INTRODUCTION

David Kary's "When is an Exercise in Logic also a Logic Game?" uses Bernard Suits's analysis of game playing to illuminate a difference between Sudoku and Analytical Reasoning (AR) in the form of logic exercises. I am sympathetic both to Suits's account of game playing and the way in which Kary deploys it. In this commentary I will confine myself to raising a worry about Suits's account of game playing and use that worry to suggest that the difference between Sudoku and the sorts of logic exercises used in reasoning courses and on standardized tests may not be as substantial as Kary thinks. None of this undermines Kary's main claims. The best I can hope to accomplish in this commentary is illumination through nitpicking.

2. TO PLAY A GAME

As Kary notes, Suits's wonderful and delightful book, *The Grasshopper: Games, Life, and Utopia* defines game playing as:

> to attempt to achieve a specific state of affairs [prelusory goal], using only means permitted by rules [lusory means], where the rules prohibit use of more efficient in favour of less efficient means [constitutive rules], and where the rules are accepted just because they make possible such activity [lusory attitude] (1978: 41, square brackets in original).

For an activity to be an instance of playing a game it must meet all three necessary conditions, conditions which are jointly sufficient.[1] Sudoku is, our intuitions tell us, clearly a game. And, not surprisingly, the gold standard account of game playing agrees with intuition in holding that, except in rare circumstances, those who play Sudoku are playing a game. On this, Kary's analysis seems to be to be correct. Yet Kary's position is that only a rare few of those engaged in AR are game playing. About this latter point I am sceptical.

[1] As Suits would say, once you have everything that is necessary you have what is sufficient. If in supposedly having everything that was necessary you did not, simply in virtue of that, have what was sufficient, then obviously there was something that was necessary that you did not yet have. Once you have everything that is necessary you necessarily, have what is sufficient. See Wein 1980 for my views on definition.

Zenker, F. (ed.). *Argumentation: Cognition and Community. Proceedings of the 9th International Conference of the Ontario Society for the Study of Argumentation* (OSSA), May 18-21, 2011. Windsor, ON (CD ROM), pp. 1-3.

3. SUDOKU, ANALYTICAL REASONING, AND TWIN EARTH

Suppose Hilary Putnam was wrong about Twin Earth. Putnam said that the only difference between Twin Earth and here was some obscure difference between the molecular structure of what we and Twin Earthers both call "water".[2] But suppose that, in fact, on Twin Earth the best way to attract sexual partners (at least among a significant segment of the population) is to take up Sudoku and *love doing it for its own sake*. (Whether this is caused by a difference between XYZ and H_2O or not is something I will leave to those whose leanings are less Humean than mine.) Once people noticed that a sufficiently sexy part of the population was sexually attracted to people who played Sudoku for its own sake, many people who were not attracted to Sudoku for its own sake nonetheless took up the game. Some realized that the best way to develop a love for Sudoku was to get good at playing Sudoku and that the best way to do that is to start playing Sudoku. Their goal was to get good enough at Sudoku so that they might come to play it for its own sake so that they thereby might have a better chance at having sex with those sexy lovers of true Sudoku lovers. Others, realizing that only those Sudoku players who love the game for its own sake were succeeding in finding sex partners through Sudoku, hoped that, were they to be seen playing Sudoku, they might be mistaken for people who loved the game for its own sake. Perhaps they were too lazy to do the work to change their preferences, or perhaps they reasoned that people make mistakes about other people's attitudes all the time and, who knows, I might be among the lucky ones and get lucky. Finally some—perhaps because hormones were impeding their powers of observation—never even noticed that Sudoku was a game or that among Sudoku players only those who loved Sudoku for its own sake were regularly hooking up with local hotties. They took up Sudoku entirely for instrumental reasons (and instrumental reasons based on false beliefs).

Now all four groups—the original Sudoku players who played the game for its own sake; those who took up Sudoku hoping to come to like Sudoku for its own sake and then reap the consequences they noticed followed from having that intrinsic desire; those who took up Sudoku hoping they would be mistaken for as someone who liked Sudoku for its own sake and would then enjoy the consequences that might follow from that mistake; and those who took up Sudoku for the purpose of making themselves sexually attractive by engaging in an activity in which they had no interest—are all playing Sudoku. The first group clearly meets all three of Suits's conditions. So does the second group. Indeed, many game players start out just this way before moving into the first group. ("I took up tennis to help lose a few pounds but now I just love the game" or "I took up Sudoku hoping it would slow the onset of senility but now I just love playing it.") The third and fourth groups are a bit trickier. Their members lack the perfect lusory attitude. Indeed, the members of the third group recognize, this fact though the less observant members of the fourth group do not. But I fail to see how members of either group differ from, say, those professional athletes who (as we say of them) are playing just for the money. These last two groups of Sudoku players are playing just for the sex, but playing Sudoku they are. So they have to fit into Suits's account of game players.

But how do these two groups differ from those who engage in AR because doing AR is, say, a way get into law school? Some will have practiced AR in LSAT preparation

[2] This is the way he puts it in Putnam 1981 but in Putnam 1992 (responding to problems raised by A.J. Ayer) Putnam backs away from his earlier Kripkean essentialist position.

courses and discovered that they just love doing AR games for their own sake. Indeed, some of them may have come to like doing this so much that they abandon their ambitions to go to law school and instead devote their lives, Grasshopper like, to playing AR games. They are like my first group of Sudoku players, and clearly these folks have the lusory attitude and for them AR is a game. Others will have taken LSAT preparation courses and realized about themselves that if only they could get good enough at doing AR they could love doing AR for its own sake. Surely these are just like my second group of Sudoku players, of whom we had no trouble saying were playing a game when they played Sudoku. Still others, while doing AR exercises in preparation for the LSAT, will wish that they liked the game more so that doing the preparation was not such a chore. And, while it is the case that these folks don't particularly care whether the LSAT markers (presumably, machines) think they liked doing AR, they very much care that the LSAT markers take them to be good at AR. They might even hope that a high LSAT score will convince law school admission committees that they are the sort of person who is not just good at doing AR but likely likes doing AR. They are like my third group of Sudoku players. Finally, there are those who are like that final group of Sudoku players: they do not like AR, nor do they adopt the lusory attitude for its own sake. But it seems to me that on the Suits/Kary account, even these people are playing AR, just as much as my last group of Sudoku players who only want to hook up with someone.

4. CONCLUSION

A virtue of Kary's analysis is that it makes us realize in quite a graphic way something that Suits observed. Given certain circumstances—circumstances that more and more members of our species are finding themselves in—many activities which we once thought of as non-game playing will become instances of game playing. Lots of people trying to get into graduate or professional schools may not think that the things they have to do to get into such schools are playing games. But that is, nevertheless, what they are.

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